ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
An Allocation of Spectrum for the	)	RM-_____
Private Mobile Radio Services	)	

TO: The Commission

PETITION FOR RULE MAKING
SUBMITTED BY THE
LAND MOBILE COMMUNICATIONS COUNCIL

April 22, 1998

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Executive Summary

On August 5, 1997, the Balanced Budget Act of 1997 ("Budget Act") was signed into law.[1] Accompanying the Budget Act was the Report of the House and Senate Conferees, which included the following directive:

> [T]he conferees expect the Commission and the NTIA to consider the need to allocate additional spectrum for shared or exclusive use by private wireless services in a timely manner.[2]

Also in August of 1997, the Spectrum Planning and Policy Advisory Committee ("SPAC") released its report to the National Telecommunications and Information Administration ("NTIA") on the implementation of Federal Government spectrum relocation.[3] This report recommends that the NTIA consider a transfer of Federal Government spectrum on a shared basis and states that there is an "ingrained symmetry" between Federal Government and Industrial and Business radio systems.

Accordingly, in order to expedite the consideration of the needs of the private wireless services community, and to promote the sharing of Federal Government spectrum with the private mobile radio services, the LMCC is submitting this petition.

The LMCC also takes this opportunity to detail its views on responsible spectrum management and effective methods for the allocation and assignment of spectrum for the Private Mobile Radio Services ("PMRS"). To that end, included in this petition is the following:

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[1] *See* Balanced Budget Act of 1997, Pub. L. No. 105-33, 111 Stat. 251 (1997).

[2] 143 Congressional Record H6172 (July 29, 1997).

[3] *Report of the Spectrum Planning and Policy Advisory Committee Task Force on Federal Government Spectrum Relocation Implementation* (released August 7, 1997).

- A review of the development of the Commission's Commercial Mobile Radio Services licensing processes, and the impact this development has had on the PMRS community.

- A demonstration of the pressing need for additional spectrum allocations for PMRS systems, including; current congestion on existing bands, increasing spectrum scarcity resulting from simple growth and demographic changes; the need to implement new broader band technologies, including voice-data capabilities and system integrations.

- An examination of the unique characteristics and service requirements of PMRS systems, and the inability of commercial service providers to meet these unique needs.

- An identification of specific bands of spectrum available for allocation to PMRS systems.

- An analysis of the most efficient means for the management of a shared allocation of spectrum, including: engineering criteria; administrative processes; and Commission-certified frequency advisory committee management that minimizes the need for the expenditure of scarce Commission resources.

In addition to the issuance of the Balanced Budget Act Conference Report, and the release of the SPAC Report, this petition is in response to the sense within the PMRS community that the needs of this vital industry are not being adequately addressed by the Commission. The LMCC believes that there is a pressing need for the Commission to engage in a public dialogue on the character and needs of the PMRS industry. Accordingly, the LMCC urges the Commission to place this petition on *Public Notice* as quickly as possible. If nothing else, the ensuing comments and public debate will surely provide the Commission with a greater insight into the current environment and future development of one of its oldest and largest constituencies.

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TO: The Commission

Petition for Rule Making
Submitted by the
Land Mobile Communications Council

1. The Land Mobile Communications Council ("LMCC"), pursuant to Section 1.401 of the Rules and Regulations of the Federal Communications Commission ("Commission"), respectfully submits this Petition for Rule Making seeking an allocation of spectrum for the Private Mobile Radio Services ("PMRS"). This petition is in response to the report of the House and Senate Budget Act conferees, which directed the Commission to consider the need to allocate spectrum for the private wireless services,[1] and the report of the Spectrum Planning and Policy Advisory Committee on Federal Government Spectrum Relocation Implementation, which supported the shared use of government spectrum with non-government entities.[2]

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[1] 143 Congressional Record H6172 (July 29, 1997).

[2] *See Report of the Spectrum Planning and Policy Advisory Committee Task Force on Federal Government Spectrum Relocation Implementation* (released August 7, 1997).

I. Statement of Interest

2. The LMCC is a non-profit association of organizations representing virtually all users of land mobile radio systems, providers of land mobile services, and manufacturers of land mobile radio equipment. The LMCC acts with the consensus and on the behalf of the vast majority of public safety, business, industrial, private, common carrier, and land transportation radio users, as well as a diversity of land mobile service providers and equipment manufacturers. The membership of the LMCC includes the following organizations:

- Association of American Railroads (AAR)
- American Association of State Highway and Transportation Officials (AASHTO)
- American Automobile Association (AAA)
- American Mobile Telecommunications Association (AMTA)
- American Petroleum Institute (API)
- American Trucking Associations, Inc. (ATA)
- Association of Public Safety Communications Officials-International, Inc. (APCO)
- Cellular Telecommunications Industry Association (CTIA)
- Central Station Alarm Association (CSAA)
- Forest Industries Telecommunications (FIT)
- Forestry-Conservation Communications Association (FCCA)
- Industrial Telecommunications Association, Inc. (ITA)
- Intelligent Transportation Society of America (ITSA)
- International Association of Fire Chiefs (IAFC)
- International Association of Fish and Wildlife Agencies (IAFWA)
- International Municipal Signal Association (IMSA)
- International Taxicab and Livery Association (ITLA)
- Manufacturers Radio Frequency Advisory Committee (MRFAC)
- National Association of State Foresters (NASF)
- Personal Communications Industry Association (PCIA)
- Telecommunications Industry Association (TIA)
- UTC, The Telecommunications Association (UTC)

II. Background

3. Private radio was born out of the special needs of industry for communications -- needs that the common carrier companies could not fulfill. Companies choose to be private radio

licensees because their communications needs are too specialized; their coverage areas too unique; and their system reliability needs too critical to rely on a third-party provider of communications. These wireless communications systems allow industry to be more productive and competitive world-wide, but the ability to communicate in times of crisis can save lives within the company and the community, as well.

4. Nearly all of the FORTUNE 500 companies have at least one radio system licensed in the private radio services. The top 10 industrial companies have more than 6,000 private land mobile licenses. Today, more than 275,000 American companies, both large and small, use more than 10 million Private radios to keep their operations running smoothly.

5. The history of Private radio is the history of the regulation of the radio spectrum itself. When initially allocating spectrum under the Communication Act of 1934, the Commission included an allocation for Private users, such as public safety, aviation and agriculture. In the late 1930's and 1940's, spectrum allocations expanded to include other Private users, such as industrial companies; railroads; urban transit; electrical, water and gas utilities; forestry; and taxicab and livery companies.

6. Spurred on by technological advances during World War II, individual companies and industries increasingly used Private radio to meet their unique needs. These communications systems helped increase employee safety for companies, as well as making them more competitive. For example, crews aboard rolling trains used radio to advise personnel at switching points of the train's movement, while newspapers used radios to communicate breaking stories.

7. Private internal radio systems have become the predominant method by which taxicab companies dispatch their fleets; service organizations coordinate maintenance runs; and companies

in all industries schedule distribution of their products. It is a vital tool used by petroleum companies such as Amoco Corporation, in oil production, monitoring, and exploration. Dispatch radios help increase productivity in retail operations, both with in-store use and in delivering products. Factories and factory campuses such as Boeing's Seattle facility -- one of the world's largest -- depend on Private radio for their production-line and logistical communications.

8. Today, private radio systems are also used by companies in almost every industry: agriculture, construction, health care, hospitality, film and video production, highway maintenance, forestry, transportation, power, mining, and countless others. A great number of these markets are just beginning to realize the potential uses of private radio for applications such as patient monitoring, inventory control, process monitoring and automated operation; all of which would be difficult to conduct with commercial services. Private systems play a unique and vital role in support of our nation's economic and industrial sectors. However, in recent years the spectrum requirements of the Private radio user community have been overshadowed by the emergence of innovative and popular, consumer-based wireless services, leaving the Private user with few spectrum options.

9. In the 1993 Omnibus Budget Act, Congress amended Section 332 of the Communications Act of 1934 ("the Act") and directed the Commission to create regulatory parity among wireless Common Carriers and certain private wireless licensees that were providing service that was substantially similar to Common Carrier Service.[3] In response, the Commission developed the broad definitions of Commercial Mobile Radio Services ("CMRS") and Private Mobile Radio Services ("PMRS").

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[3] *See* 47 U.S.C. §§ 151-614 (Communications Act of 1934 as Amended).

10. The regulatory structure that the Commission has adopted for CMRS has been wide-area geographic licensing and a system of competitive bidding for the resolution of mutually exclusive applications. Insofar as this policy has been implemented for newly allocated CMRS spectrum, it has been largely successful. However, because the Commission has begun to apply this regulatory structure to the CMRS that were formerly licensed as PMRS, and because these CMRS systems have been licensed on bands of spectrum that are heavily occupied by systems that remain PMRS, the Commission has effectively removed large blocks of spectrum from PMRS allocations (*see* Sec. III, D *infra*). Further, because the Commission has been able to raise substantial revenues for the Federal Treasury through the auctioning of the electromagnetic spectrum, it has been hesitant to allocate any spectrum on a non-auction basis.

11. In 1997, Congress again amended the Telecommunications Act and redefined the Commission's competitive bidding authority.[4] Prior to the 1997 Amendments to the Act the Commission could only resolve mutually exclusive applications through a process of competitive bidding when "the principal use of such spectrum will involve, or is reasonably likely to involve, the licensee receiving compensation from subscribers . . ."[5] This unambiguous language made all PMRS wireless applications exempt from competitive bidding. Under the Commission's revised auction authority, the exemption from auctions is limited to "public safety radio services." However, such services are defined to include "PMRS internal radio services" that "protect the safety of life, health and property."[6] While the 1997 amendments to the Act may have, arguably,

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4 *See* 47 U.S.C. § 309(j)(2)(A)(1997).

5 47 U.S.C. § 309(j)(2)(A)(1996).

6 47 U.S.C. § 309(j)(2)(A)(1997).

limited the class of applicants that are inherently exempt from auctions, nothing in the 1997 amendments altered the fundamental, specifically enumerated limits on the Commission's competitive bidding authority.

12. Under section 309(j)(4)(C) of the Act, the Commission -- in designing a system of competitive bidding -- is charged by Congress to consider "the characteristics of the proposed service" in order to "prescribe area designations and bandwidth assignments that promote (i) an equitable distribution of licenses and services among geographic areas, (ii) economic opportunity for a wide variety of applicants, including small businesses."[7] Even the most superficial analysis of the "character" of PMRS "service" reveals that wide-area geographic license "designations" are an inappropriate method for the assignment of PMRS wireless licenses. Because PMRS systems are inherently designed for the service of small or distinct geographic areas (typically, less than 1,000 square miles and often fractions of a square mile, in the case of low power operations), the wide-area model applied for CMRS systems is inapplicable. By their very nature PMRS systems require site-by-site licensing.

13. The Commission's competitive bidding authority is further restricted by Section 309(j)(6)(E) of the Act, which states that nothing in the statute should "be construed to relieve the Commission of the obligation in the public interest to continue to use engineering solutions, negotiation, threshold qualifications, service regulations, and other means in order to avoid mutual exclusivity."[8] By implementing wide-area geographic licensing schemes for PMRS applicants, the Commission not only fails to make any attempt to avoid mutual exclusivity, it actually creates

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[7] 47 U.S.C. § 309(j)(4)(C).

[8] 47 U.S.C. § 309(j)(6)(E).

mutual exclusivity where it does not naturally exist. In the case of shared spectrum, mutual exclusivity will never exist, because multiple applications for the same frequency may be granted.[9]

14. The great majority of PMRS wireless systems exist in a shared or coordinated environment. Under this licensing scheme, the Commission's certified frequency advisory committees are charged to coordinate pending applications and to recommend frequency assignments that will minimize adjacent and co-channel interference both to and from incumbent licensees. In a shared environment, the coordinating committees select frequencies based on the lowest acceptable level of system degradation. As a result mutually exclusive applications are not filed, and auctions are never an appropriate licensing mechanism in this context.

15. Because the current spectrum allocation environment promotes the development of CMRS at the expense of PMRS, a spectrum shortage crisis has emerged in the PMRS industry. Numerous examples can be given of the impact of this spectrum shortage on PMRS users. For example, the owner of a start-up limousine company that serves the Brooklyn, New York, area reports that the lack of available spectrum is prohibiting the growth of his business. Like other small non-communications business owners, he found the prospect of entering an auction entirely unrealistic. As a result, he is forced to use a heavily congested, shared UHF channel. Common waits of 10-15 minutes for a clear channel regularly delay the dispatch of his drivers. During the many peak times of the day and night when no open channels are available, he is forced to use a CMRS system that is not only dramatically more expensive but does not provide dispatch service.

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[9] In a shared spectrum environment, the grant of one application does not preclude the grant of additional applications on the same frequency at essentially the same location. Co-channel licensees are required to monitor the channels on which they are licensed, and may only access the channel when it is not in use by other co-channel licensees.

16. Users of two-way radios at all of the ports of entry around the country are placed in danger on a daily basis due to the lack of available spectrum. The entire process of unloading 5,000-ton cargo boxes from 80-foot tall vessels onto holding docks, and again onto trains or trucks for distribution is coordinated through the use of two-way radios. In the Los Angeles port authority alone, four to five cargo ships are typically loading and unloading cargo at the same time with each terminal requiring as many as 16 different frequencies for crane operators, top handlers, side handlers, yard handlers, and superintendents use to ensure the safe transfer of cargo. Currently, port authorities use shared UHF frequencies for these critical operations, which are often obstructed due to the increased congestion on these channels. This congestion can, and does, bring life-threatening consequences when operators hear "Drop it!" from other nearby users and mistakenly believe the command was intended for them. Two deaths in the Los Angeles port in the past 90 days were the results of this type of mis-communication from a shared channel. Given sufficient spectrum, these disasters could be avoided, as frequency advisory committees could ensure that no two stevedore operations were licensed on the same channels.

17. A major airline reports that traffic has been growing at a rate of 4% per year in the U.S. and that cargo traffic is expected to grow at a 20% rate. The amount of spectrum available to them, on the other hand, has not grown at all in the last 30 years. Pressures of the economy require greater efficiency and increased productivity of airlines, making dispatch radio even more heavily used. All airlines use two-way radios to manage personnel safety and maintain an acceptable level of customer satisfaction. However, as the spectrum shortage grows, levels of service and safety drop.

18. Public Service Electric & Gas Company ("PSE&G"), headquartered in Newark, NJ,

suffers from a severe lack of available MAS and telemetry spectrum used for meter reading and remote control purposes. Due to this lack of spectrum, the gas company is forced to use public carrier services, which increase their operating costs by roughly $1.2 million per year. In addition to the incremental costs, the service from these public carriers is unreliable, as they now must compete for channels with all other users. In the event of any emergency, such as bad weather, traffic jams and traffic accidents when cellular use increases, the ability of PSE&G to perform critical operations that protect the safety of the general public may be compromised.

19. These examples of the real world effect of the PMRS wireless spectrum shortage are repeated again and again in industry after industry across the entire nation. Accordingly, the LMCC urges the Commission to adopt policies that not only address this spectrum shortage but also recognize the vital role that PMRS radio systems play in the U.S. economy, as well as the unique licensing requirements of these systems.

III. Spectrum Requirements of the PMRS Community

20. The needs of the PMRS wireless community have been well established in a number of government agency and industry reports.[10] While these reports come from a variety of perspectives, they reach remarkably similar conclusions: due to changing demographics, regulatory developments, and technological advancements, there is a drastic shortage of spectrum

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[10] *See Report of the Spectrum Planning and Policy Advisory Committee Task Force on Federal Government Spectrum Relocation Implementation* (released August 7, 1997) (*SPAC Report*); *PMRS Land Mobile Services: Background*, Wireless Telecommunications Bureau Staff Paper (released December 18, 1996)(*Wye Report*); *Land Mobile Spectrum Planning Options*, NTIA Special Publication 95-34 (released October 19, 1995)(*Second NTIA Report*); *U.S. National Spectrum Requirements: Projections and Trends*, NTIA Special Publication 94-31 (released March 1995)(*First NTIA Report*); *Petition for Rule Making*, filed by the Coalition of PMRS Users of Emerging Multimedia Technologies (filed December 23, 1993).

available for PMRS licensees.[11]

A. Congestion on Existing Allocations

21. In 1995, the National Telecommunications and Information Administration ("NTIA"), under a mandate from Congress, initiated a *Strategic Spectrum Planning Program* and issued a two-volume report on future spectrum requirements. The first volume of this report found that while there was a wide-spread need for additional spectrum across nearly all wireless services, the most critical need was for the land mobile services.[12] The NTIA study also found that spectrum requirements for the PMRS wireless community would double over the next 10 years.[13]

22. The second volume of the NTIA study focused on land mobile spectrum needs and attempted to quantify the level of congestion on existing allocations. To effect this quantification, the NTIA produced a Spectrum Use Factor ("SUF") that measures spectrum congestion in a given geographic area. These SUF numbers range from below 0.2 -- least congested -- to 0.8 and above -- most congested.[14] The NTIA report included a set of maps illustrating the nationwide levels of spectrum congestion in different PMRS bands, which is attached at Appendix A.

23. In the frequency ranges most heavily used by PMRS wireless licensees, the NTIA report

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[11] This petition seeks additional allocations for PMRS; however, the LMCC recognizes that there are operators of localized, primarily dispatch systems that, because they offer minimal interconnection, are currently classified as CMRS providers. As the FCC further develops its use of the CMRS "covered carrier" definition adopted in the E-911 proceeding (CC Docket No. 94-102), the characterization of "non-covered carriers" may prove better suited to define eligibility for the allocations sought herein.

[12] *First NTIA Report*, at 33.

[13] *Id* at 34.

[14] *Second NTIA Report*, at 2-4.

found very heavy congestion. For the frequency range between 450-470 MHz, NTIA found that for large areas of the country, most notably the eastern half of the United States and the three westernmost states, spectrum resources in the band were at the maximum level of occupancy, 0.8 and above. Similar findings were made with regards to the 800 MHz band. An analysis of the VHF bands indicated slightly lower levels of congestion nationwide; however, certain urban areas showed maximum spectrum usage levels.

24. An independent analysis conducted by the LMCC echoes NTIA's findings and is summarized in Appendices B, C, D, and E. Included in this analysis, and attached in Appendix B, is a review of available channels in the most heavily relied upon PMRS wireless bands. As discussed below, the UHF (450-470MHz, 470-512MHz), and 800 and 900 MHz bands constitute the backbone of the nation's PMRS wireless networks. In the top 10 urban markets reviewed, no PMRS channels are available in the 470-512, 800, and 900 MHz bands. Channels are available on a shared basis in the 450-470 MHz band, however most available frequencies support between five and 10 co-channel licensees, with some channels supporting as many as 15 co-channel licensees, each employing potentially hundreds of mobile units. The result of this heavy occupancy on these shared channels is that communications quality and reliability is sorely compromised. Because of either technical limitations or extreme congestion, nearly every band of spectrum currently allocated for PMRS use is at the limit of its useful application.

i. Low Band VHF (25-50 MHz)

25. The VHF Low Band is basically not useable in urban areas, because building penetration is poor. Interference can be severe from long-range interfering signals, and substantial man-made noise interference predominates in the built-up urban areas. Because of the low frequency.

antennas tend to be very large, and when made small enough for reasonable portable products, they become inefficient. Since the band is not structured on a paired frequency basis, simultaneous transmit-receive is not possible.

ii. High Band VHF (150-174 MHz)

26. The VHF High Band is substantially more useful though still not optimum in urban areas. There is little long range interference, less man-made noise and shorter antennas, which in turn allow more efficient design. Building penetration is improved over low band but is still marginal. Again, with no inherent frequency paired band structure and still relatively long wavelengths, mobile duplex capability is generally impractical

27. Overall, both low and high band VHF licenses are assigned on a time-shared, or non-protected service area ("non-PSA") basis. That is, there are no physical minimum spacing distances regulated between co-channel systems. This has historically resulted in the efficient use of the spectrum, i.e. more users per megahertz in a given geographical area. However, because of drastic spectrum shortages in high-demand urban areas, more and more users are packed into a given area. This overloading results in the degradation of the fundamental quality of the communications. With little or no on-going monitoring of this quality level, overall communications quality degradations are hidden from view.

28. Furthermore, this non-PSA basis generally precludes use of some newer technologies, such as trunked systems, while also limiting potential for "guaranteed" higher reliability applications, such as critical data links. Finally, the Commission, in its "refarming" proceeding,

has begun a transition from 15 kHz channels to 7.5 kHz channels.[15] While this narrowbanding presents the potential for increased spectrum capacity, transition delays and interference problems limit the potential benefits (*see* Sec. III, B, *infra*)

iii. UHF (450-470 MHz)

29. For a number of reasons the 450-470 MHz UHF band is considered by many to be the urban "work-horse" band. Most importantly, the paired frequency structure of the band allows reasonably straightforward implementation of duplex base station and repeater configurations. However, the relatively small 5 MHz spacings between the pairs generally disallows full duplex portable radios. Applications that might benefit from full-duplex links, data for example, are generally unavailable.

30. Since license assignments in this band are also on a non-PSA, time-shared basis, extreme congestion in the band has resulted in a continuously degrading level of communications quality, due both to co-channel and adjacent channel interference as well as the increased interference noise floors.

31. As in VHF, the "refarming" proceeding sets a strong direction toward licensing of only narrower channels. The transitional concerns are heightened due to the fact that this is the urban "work-horse" band, with more complex repeater systems in place. Further, whereas the VHF transition is to be a one-step process (15 kHz to 7.5 kHz channels), the UHF band will experience a two-step process, moving first from 25 kHz to 12.5 kHz, then subsequently to 6.25 kHz. However, the perceived 4:1 packing density increase will not be attained for decades due to the

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[15] *See In the Matter of Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing Them*, PR Docket No. 92-235.

need for a reasonable transition period for existing equipment (*see* Sec. III, B, *infra*).

iv. UHF (470-512 MHz)

32. The 470-512 MHz band also qualifies for urban "work-horse" status, for the same reasons as the 450-470 MHz band. Unfortunately, the band is only available in 11 cities, with either 6 or 12 MHz assignable. All of the other 450-470 MHz characterizations apply here, except for the fact that this band was originally implemented with system spacing rules designed to provide protection, albeit extremely conservatively, to shared spectrum TV systems.

33. Communications quality levels are generally higher in this band due to the pseudo-PSA nature of the assignments. However, it is probable that the band will ultimately yield considerably less "refarming" packing density increase, due to these same regulatory restrictions, but will tend to maintain the higher quality communications.

v. UHF (421-430 MHz)

34. This band was put in place in three cities, Detroit, Cleveland and Buffalo, where 470-512 MHz was not available due to Canadian border (TV) restrictions. As such, all 470-512 MHz characterizations apply.

vi. 800/900 MHz

35. This is another urban "work-horse", with very good building penetration and smaller, efficient antennas that offset slight propagation loss penalties as compared to UHF. Frequency pair spacings of 45/39 MHz allow full duplex portables in small size and at low cost. There is extensive use of repeaters in these bands, though much of the mobile use, both SMR and non-SMR, is still half-duplex for dispatch applications.

36. PSA license assignments have made implementation of trunked system technology

possible, which in turn has expanded use of shared PMRS systems for smaller users. Large PMRS users also use trunking to gain access to advanced features, such as call groups, that are not generally available in conventional systems.

37. Competitively driven SMR consolidation is underway, and the FCC is in the process of auctioning off any remaining "white space" to CMRS service providers, leaving no opportunity for additional urban licensing of PMRS systems (*see* Sec. III, D, *infra*).

B. "Refarming" will provide limited relief

38. In calculating the amount of spectrum that the PMRS wireless community will require, the NTIA estimates that technological advancements, such as the transition to narrowband equipment, will alleviate some of the congestion in existing allocations and will maximize the relief any new allocations will provide. However early experience with the implementation of the "refarming" proceeding shows that the transition to narrowband channels will provide only limited relief.

39. Time sharing of channels in a given geographic area is very spectrum efficient for multiple small users, but only when their modes of operation and technology use are quite similar. Mixing isochronous voice and asynchronous data services has always been a problem, engendering channel monitoring issues. Generally the "solution" was to depress the use of data, an important application for PMRS users. Mixing transmission technologies, i.e. analog and digital voice, is also problematic and will become more common in the "post-refarming" environment. Similarly, mixing different channel bandwidths also causes substantial compromises and, eventually, when all bands are narrowed, yields greater adjacent channel interference levels.

40. The net effect is that "refarming" with 4:1 channel splits cannot ultimately yield a 4:1

user capacity increase. Unless it is assumed that the overall communications quality level may be degraded, a 3:1 capacity increase is more likely. Attached at Appendix C is a projection of the capacity increases that will be achieved through the transition to narrowband equipment. This analysis projects only a 2:1 capacity increase as far out as 2010, with the full benefits of "refarming" not approached until 2020.

41. This is not to say that the "refarming" initiative is inherently flawed but, rather, to recognize that the process is one of attempting to keep pace with, rather than effectively solve, the spectrum shortage problem. In addition, it should be clear that any definition of "spectrum use efficiency" or "capacity" requires that some communications quality level reference be put in place and maintained constant for comparison purposes.

42. When PMRS began to develop serious spectrum shortages in urban areas, rather than supplying additional spectrum to meet the needs of applicants, the solution has been to increase the number of co-channel systems licensed on a given frequency. The net effect has been that "efficiency" was theoretically improved through forced degradation of communications quality -- more and more units packed into a given geo-spectrum space.

43. Thus, one major component of the PMRS spectrum shortage problem is the need to achieve and maintain some acceptable level of communications quality for the industry that is generally higher than the level in many urban areas today.

C. Need for spectrum for broadband applications

44. While new technology will alleviate some of the congestion problems facing the PMRS community, it may actually exacerbate the problem to a certain extent. New applications are available for PMRS uses that promise to greatly enhance the efficiency of many businesses

currently implementing PMRS systems. However, many of these applications require access to broadband channels. Examples include:

- GPS location devices for the tracking and mapping of delivery, taxicab and livery, and security services.
- Mobile facsimile services for the transmission of text and images.
- Data capabilities for document processing such as customer database information, messages, files, etc.
- Data capabilities for production processes such as inventory tracking, production cycles, shipments to billing changes on customer files.
- Image transmission of still photographs such as real estate properties.
- Slow scan video transmission of images, and full motion video for coordinating activities such as heavy construction in progress.
- Telemetry devices for monitoring, signaling, or stopping and starting automated operations.
- Connection capabilities to PBX and or outside cellular systems.
- Remote interface with internal computer LAN systems, corporate intranet, and the Internet.

45. The hallmark of the PMRS industry is that it is an important tool for American industry and for the safe operation of the nation's critical infrastructure. PMRS licensees do not operate their systems as a source of revenue but rather as a means of supporting the day-to-day needs of their businesses to protect the safety of their employees, customers, and the general public, and to effectively compete in a global market place. As new applications for PMRS use become available there is the potential for wide-spread benefits across the economy. However, if adequate spectrum is not available for the implementation of these new applications, important opportunities will be lost for the American consumer, and American industry will lose a competitive advantage. To a certain extent this undesirable outcome is already being realized across a broad cross-section of industries and services.

46. Attached at Appendix D is an analysis of the projected penetration of these advanced services. Starting as early as the year 2000, demand for advanced services will begin to appear in

traditional markets. These new services promise significant benefits to nearly all aspects of industry but will require additional spectrum for this promise to be realized.

D. Reallocation of PMRS Spectrum to CMRS use

47. In addition to the growing need for spectrum for new services, and to accommodate future growth of traditional services, the spectrum shortage crisis has been aggravated by regulatory changes. As discussed at paragraphs 9-15 *supra*, bands of PMRS spectrum have been reallocated for CMRS services and slated for auction.

48. In 1991, a portion of the 220-222 MHz band was allocated by the FCC for "non-commercial" nationwide land mobile radio systems. This new band presented the opportunity for new and innovative PMRS applications. For instance, a consortium of approximately 30 utility companies filed applications to develop a nationwide not-for-profit radio system that would be used by the utilities to meet their internal day-to-day needs for dispatch communications, as well as interoperation between utility crews responding to a widespread emergency. However, these innovative PMRS applications never got the chance to develop, because the FCC never acted on these applications. Finally, in 1997 the FCC decided to eliminate the "non-commercial" set-aside, to return the applications filed in 1991, and to hold auctions for these channels among new applicants.[16]

49. In the 800 MHz band, PMRS systems have had a major presence since the band was first allocated and assigned in the 1970's. However, in PR-Docket 93-144, the Commission began the

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[16] *220 MHz Third Report and Order*, PR Docket No. 89-552, (released March 12, 1997).

process of introducing geographic licensing to the CMRS services in the 800 MHz band.[17] Initially, the Commission decided to split the 800 MHz band into two "pools." The Commission established 200 channels for CMRS use to be assigned by geographic licenses and auctions, and reserved 230 channels for small dispatch and "General Category" systems, to be licensed on a site-by-site basis.[18] However, in the *Second Report and Order* in this proceeding, the FCC reconsidered its decision to license the 230 channels on a site-by-site basis and announced an auction for geographic area licenses for these channels.[19] The inevitable result of this decision is that all future access to the "General Category" channels in the 800 MHz band will be limited to large CMRS auction winners. Even though there is no mandatory relocation of incumbent PMRS licensees in the pending auction of the "lower 230" 800 MHz channels, these incumbents will be pressured to vacate their license holdings. The reality of the business plan of the eventual auction winner will almost certainly require the relocation of these incumbent systems. Without additional spectrum being made available for their relocation, PMRS licensees in this band face uncertainty at best.

50. Additional bands that are being reassigned from PMRS to CMRS use include 900 MHz Multiple Address Systems ("MAS") bands. MAS are point-to-multipoint systems operating in the 900 MHz band which are used by utilities, pipelines, and oil and gas production systems for various telemetry and control functions, including system monitoring, distribution system control,

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[17] *First Report and Order*, (FCC 95-501), PR Docket No. 93-144, 61 Fed. Reg. 6138 (1995).

[18] *Id.*

[19] *Second Report and Order*, (FCC 97-233), PR Docket No. 93-144, adopted June 23, 1997, released July 10, 1997.

load management, and nuclear warning sirens. And while MAS are depleted in many areas of the country, industry need for these channels is increasing. This demonstrated demand prompted the FCC to open a new band of MAS channels in 1992. However, the FCC has apparently aborted its efforts to satisfy the strong PMRS need for these channels. Instead, the FCC has initiated a rule making to dismiss all pending PMRS applications, and to declare MAS to be a "commercial" service subject to wide-area geographic licensing and auctions.

51. Interservice sharing of the Maritime channels with Industrial/ Land Transportation licensees in areas away from navigable waters was granted in 1996.[20] This interservice arrangement provided much needed spectrum relief in the bands below 800 MHz, without any ill effects on the maritime services. However, in 1997, the Commission froze all interservice applications in anticipation of the wide-area geographic licensing and auctioning of the maritime channels and effectively ended interservice sharing opportunities on these bands.[21]

52. As the Commission has emphasized the CMRS services, there has been a prevailing school of thought that PMRS needs can be fully satisfied by CMRS service providers. This belief is misguided. In fact, while nearly all large PMRS licensees maintain contracts with CMRS providers for some of their communications needs. PMRS licensees have additional unique needs that cannot be met by CMRS providers.

IV. PMRS Needs vs. Commercial Services

53. PMRS users own and operate complex communications systems to provide effective

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[20] *See In the Matter of Amendment of the Commission's Rules Concerning Maritime Communications, First Report and Order*, PR Docket 92-257, 10 FCC Rcd. 8419 (1996).

[21] *See Second Report and Order*, PR Docket 92-257, (adopted June 17, 1997, released June 26, 1997).

internal communications among team members, operate complex machinery, and monitor remote equipment, among other uses. These internal communications are critical in ensuring the execution of operational and administrative objectives such as improving efficiency and productivity, enhancing the safety of employees and the public that they serve; and improving the responsiveness to the needs of their customers. While PMRS users subscribe to CMRS services such as cellular and paging in order to meet some of these objectives, it is impractical and often impossible for CMRS services to meet all of the their needs independently.

54. PMRS communications systems are generally designed to serve the specific, unique communications needs of the operator of the system. In contrast, CMRS systems are designed to provide a range of services that will appeal to a much broader base of users. As stated in the *Wye Report*, "in many cases, PMRS users represent a thin and unique market that CMRS providers have little incentive to invest in to serve; there is usually not enough of a return involved to justify the capital investment to serve one or a few PMRS customers."[22] Therefore, PMRS users have a number of unique requirements that cannot be met by CMRS. These are discussed at length below:

A. Immediacy/Priority Access

55. PMRS users rely on their ability to communicate among work teams instantaneously in order to coordinate daily activities, as well as control emergency situations. The timing of these coordinated communications is critical in many environments and could endanger the safety of the team or the public if delayed for even a fraction of a second. Priority access is particularly necessary during disasters and emergencies when public telecommunications circuits are often

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[22] *Wye Report* at 23-24.